Multi-lab study of mouse preference learning in the spatially enriched IntelliMaze

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Environmental enrichment has been suspected to potentially interfere with learning
performance in mice, though the published evidence did not reveal any significant effect
so far. This study was aimed at testing the effect of spatial enrichment in the IntelliMaze
on preference learning in the IntelliCage. The IntelliMaze expands the experimental
setting of the IntelliCage by allowing animals to enter additional arenas that could be
used to apply additional paradigms concomitantly, in order to further enhance the
throughput of the fully automated conditioning schemes available in the IntelliCage. Two
spatial learning paradigms were compared in four European laboratories between groups
of mice either attached to an additional arena or kept in IntelliCages with no added
device. Experiments were conducted with three strains of laboratory mice using a fully
balanced and synchronized design. The results show that access to additional arenas
actually enhanced spatial preference learning in the IntelliCage. While spatial expansion
resulted in lower rates of visiting the conditioning corners in the IntelliCages, it could be
shown that the increase in preference accuracy did not result from differences in visiting
rates. Hence, spatial complexity has a generically enhancing effect on spatial learning
performance. We also noted that the mouse strain differences in spatial reversal learning
previously identified in the IntelliCage, persisted with the enriched paradigm, so that the
basic concept of the IntelliMaze appears to represent a valid approach to an even more
efficient, high-throughput behavioral and cognitive phenotyping in laboratory mice.